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## FORMWORK FOR CYLINDRICAL COLUMNS

### DESCRIPTION

#### 5 OBJECT OF THE INVENTION

The present invention refers to a new formwork for obtaining cylindrical columns, which has been specially conceived as a disposable or single-use element and which is specially adapted for obtaining columns made of reinforced concrete.

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The object of the invention is to achieve optimal results by using such a formwork with a simple and therefore economical structure, with the highest dimensional and formal precision and with an optimum finishing of the column to be obtained.

#### 15 BACKGROUND OF THE INVENTION

In order to build a column made of, for example, reinforced concrete, it is required to have a mould or formwork to provide the definitive configuration and dimensions to the column; said formwork must comply with two different but complementary  
20 characteristics: it must assure a perfect superficial finishing of the column and its cost has to be sufficiently low to make it profitable for the constructor, especially taking into account that this is a disposable formwork.

In this sense it is worth to mention the Spanish patent having application number  
25 9800419, of which the present applicant is the owner, wherein a disposable formwork for columns is described, being structured from a tubular core or body, based on a plurality of expanded polystyrene pieces, fixed to each other by means of adhesive along their joint edges; said tubular core being innerly coated with a plastic sheet constituting a watertight barrier, fixed to said core by means of an adhesive layer;  
30 externally, the whole formwork is completed with a reticulated support made of a glass fibre mesh, rolled up helicoidally on the tubular core and fixed to the same also by means of adhesive, in such a way that said mesh provides to the whole set an appropriate mechanical rigidity against the radial forces generated by the concrete mass to be placed inside the formwork.

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This solution, specially designed for columns having a rectangular or square cross section, has been subsequently improved with the Certificate of Addition to said patent having the application number 9802487, wherein it is foreseen to replace the plastic



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a glass fibre mesh rolled up helicoidally on the annular body, for the obvious purpose of fixing said laminates and due to the absence in this case of the tubular body made of expanded polystyrene pieces.

5 This basic solution can be taken as a departing point and it presents only the problem of the lack of formal stability of the formwork which in fact tends to adopt an oval configuration during its manipulation, without reaching the total flat state because the external reinforcement does not allow it; nevertheless this is not an important problem because the pressure that will be later exerted by the concrete will urge the formwork  
10 to adopt a perfectly cylindrical configuration; however, it may create a certain number of manipulation problems and this is why it has been foreseen that optionally the structure described can be complemented with a series of belts or bands conveniently distributed along the formwork, having a rigid constitution in order to avoid its deformation; said belts can be metallic in which case they will be in the form of  
15 recoverable adjustable clamps or they can be also made of expanded polystyrene, in which case they will be disposable as the rest of the formwork.

It has also been foreseen that, in order to provide the formwork with a structural rigidity, instead of said belts or bands, an intermediate layer of expanded polystyrene  
20 being placed between the annular body made of rigid laminates and the external reinforcement, in such a way that it extends along the whole formwork and is sufficiently thick so as to provide the appropriate structural rigidity.

According to another embodiment of the invention and in order to achieve a higher  
25 precision in the dimensions and in the form and a better finishing of the column to be obtained, it has been foreseen the possibility to use, replacing said rigid laminates, a single plate made also of plasticised wood or rigid plastic, having a width matching the perimeter or circumference of the column to be obtained, with the special particularity that said plate includes, in its external side, a plurality of longitudinal cuts, parallel and  
30 evenly distributed, within a distance, for example, equivalent to the width of the classical laminates, said cuts affecting mainly to the thickness of the plate, in an amount of, for example, 80% of said thickness, in such a way that the plate is easily deformable for converting it into a cylindrical tube, but having a continuous internal surface which, in turn, makes it unnecessary to use the classical self-adhesive inner  
35 film.

Optionally, for economical reasons, non plasticised wood can also be used, to which a film is fixed on its inner side, preferably at the same time as it is slotted.

Furthermore, said slotted plate, after the adoption of the cylindrical configuration, receives the classical external envelope made of a glass fibre mesh rolled up helicoidally, with or without the intermediate tubular body made of expanded polystyrene contributing to make it rigid.

Preferably, and according to another feature of the invention, said external envelope, instead of being structured as a glass fibre mesh, can be made of a self-adhesive tape provided with threads of glass fibre exclusively along the longitudinal direction, which are the effective ones, once the tape has been rolled up helicoidally on the rest of the formwork; this eliminates or spares the transversal threads of the classical mesh and facilitates the fixation of said envelope.

As a complement to what has been described above and according to another feature of the invention, it has been foreseen that a pair of end rings, having a section in "U" and a diameter corresponding with that of the same formwork, collaborate with said wooden plate; the ends of the wooden or plastic plate are to be introduced inside the rings, once the cylindrical configuration has been achieved, such as to facilitate the shaping of said plate and to confer a higher rigidity to the formwork for its transport, while assuring a perfect circular form of the cross section of the formwork during its placement in the building site.

## DESCRIPTION OF THE DRAWINGS

In order to complete the present description and to contribute to a better understanding of the features of the invention, a set of drawings according to a preferred embodiment of the invention is included for illustrative and not limitative purposes, where

Figure 1 shows a perspective view of a formwork for cylindrical columns, made according to the object of the present invention, more particularly according to the simplest embodiment, in which the formwork is deformable when not in use.

Figure 2 shows, according to a representation similar to figure 1, the same formwork of the preceding figure having here belts or bands appropriately distributed along the same.

Figure 3 shows, according to a representation similar to the preceding figures, the same formwork being stiffened here by means of a continuous tubular body made of



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column having a diameter according to the same formwork; the formwork is deformable when empty, tending to acquire an oval section, and this is the reason for which it has been foreseen the possibility to include in this structure, according to figure 2, a plurality of belts or bands (5), appropriately distributed along the formwork, and made of any convenient rigid material, like, for example, expanded polystyrene or even metal, in such a way that the rigidity of said belts (5) gives the appropriate formal stability to the formwork as a whole during its handling. Said belts or bands (5) are placed on the outer side of the glass fibre mesh, as it can be noted especially in the enlarged detail in figure 2.

However, these belts or bands (5), according to the embodiment shown in figure 3, can be replaced by a tubular body (6), also made of expanded polystyrene, which can be fragmented in several portions, as it can also be seen in figure 3, to facilitate its coupling to the annular body (1) made of laminates (2); in any case, the enveloping glass fibre mesh (3) remains on the outer side of said tubular body (6) made of expanded polystyrene as it can be seen particularly in the enlarged detail in figure 3.

In such a way, a structurally simple and consequently economic slab is obtained, offering an operative surface tending to form a continuous cylinder, perfectly sealed against the aqueous component included in the concrete to be received in its interior.

In the embodiment shown in figures 4 to 7 it has been foreseen to replace said rigid laminates (2) by a single plate (7) as the basic element of the formwork, which can be made of rigid plastic or of wood plasticised on the side that will be the internal side (8); said plate has a rectangular configuration, having a length according to the height of the column to be obtained, and a width according to the perimeter of said column.

Said plate (7) is initially flat and it is provided, to facilitate its shaping, with a plurality of longitudinal cuts or slots (9) affecting mainly to its thickness, as it can be seen particularly in figure 5; said slots are open towards their outer side (10) and they define weakened zones (11) providing the plate (7) as a whole with the appropriate deformability in order to achieve an easy transformation of the flat element in figure 5 into the tubular and cylindrical element of figure 6.

The position of said tubular and cylindrical element in figure 6 is stabilised with the help of a pair of narrow rings (12), like the one shown in figure 7; said rings have a cross-section in "U" which groove (13) will receive the correspondent end of the tubular body making the plate (7); the lateral branches of the "U" are asymmetric, as it

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can also be seen in figure 7, in order to facilitate the mounting and the shaping of the plate (7). In this way, the plate adopts, by means of the end rings (12), a perfectly cylindrical configuration. However, said rings can be made simply with a rectangular section, enveloping the plate (7) and having a weakened zone in order to facilitate their cut-away and their elimination together with the rest of the formwork.

The plate (7) may present a thickness of about 2.5 millimetres and their slots (9) will have such a depth that the weakened zones (11) will present a height between about 0.3 and 0.5 millimetres; said grooves (9) are evenly distributed and separated by a distance between 35 and 50 millimetres, depending on the bending radius of the column to be obtained, the above mentioned data being given as an example because said parameters may vary outside the pre-established limits depending of the specific needs in each case.

Furthermore, the formwork will be stabilised, like in the case shown in figures 1 to 3, with the help of an envelope on the outer side of the plate (7), not shown, made of a glass fibre mesh, rolled up helicoidally with or without the interposition of a tubular body made of expanded polystyrene; similarly, on the outer side of said glass fibre mesh a plurality of bands could be established, evenly distributed along the formwork, made of any rigid material, in order to collaborate with the end rings (12) mentioned above.

The glass fibre mesh (3) shown in the embodiments in figures 1 to 3, as well as the one foreseen but not shown in the embodiments in figures 4 to 6 can be replaced by a self-adhesive tape (14) made of, for example, a support (15) of paper or the like, in one of which sides (16) a layer of adhesive glue is included, where longitudinal threads (17) are embedded, evenly distributed, in such a way that the support (15) serves simultaneously as a support for the glass fibre threads (17), physically independent to each other, and, together with its layer of self-adhesive glue (16), as fixing means of the tape (14) to the formwork, in the absence of the classic transversal threads which where required, in the conventional mesh, to keep the position of its longitudinal threads; this is done without reducing the functional performance of said envelope because the only threads that support the efforts to which the formwork will be submitted are said longitudinal threads (17), which will be substantially transversal to the axis of the formwork after the rolling up of the tape, while the classical transversal threads of the band, after said rolling up, where placed in parallel to the axis of the formwork being therefore discontinuous and inoperative.